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East Europe Report

SCIENTIFIC AFFAIRS

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EAST EUROPE REPORT
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CONTENTS

CONCERTED EFFORT FOR NATIONWIDE COMPUTER LITERACY

Budapest KOZNVEVELES in Hungarian 17 Feb 84 pp 10-14

[Article by Gyorgy Paris: "Computers in the School"]

[Excerpts] It can be established that computer technology devices are spreading more and more in socialist countries also and in the next 10-15 years a very broad sphere of the populace will use them. If these modern tools are to be used effectively a broad sphere of the populace must become acquainted with the advantages of computer technology and with methods for effective use of the devices available. This means that in the next 10-15 years the teaching of computer technology must be organized effectively in public education, the teaching of informatics must be developed further in higher education, and adult education must be organized for those who need computer technology information. Since we are talking about an undertaking affecting a broad sphere of the populace it would be useful to organize long-range programs to organize this activity and see to its introduction.

The training of teachers and instructors is a basic condition for the broad spread of computer technology information. This process began in our homeland more than 10 years ago and it is expected to continue vigorously in the decade ahead. Taking into consideration the unique problems of using computer technology and a certain reserve on the part of the populace in regard to modern devices we consider it necessary to emphasize applications information in the training of instructors, explaining the fundamentals necessary for this only to the extent necessary for effective use.

Instructors and professors working in higher education, in addition to teachers working in public education, should be provided with computer technology information. This process has started also for the training of computer technology experts and the teaching of applications began very early in the institutions of higher education. The chief task now is to make the use of computer technology a natural phenomenon in the work of instructors in university and college. This process will require very determined and appropriate guidance activity.

The teaching of computer technology in both public education and higher education will make it indispensable to revise the instructional material and the examples, experiments and tasks belonging thereto.

The teaching of computer technology cannot be imagined without tools. For this reason we must see to it that programmable pocket calculators and the simpler personal computers be available everywhere in the educational system, from general school to postgraduate training. High performance, so-called personal computers should be available in the secondary schools, including the institutions training skilled workers, and in higher education. Indeed, in addition to all this, there is an absolute need in higher education for high performance remote data processing systems and high performance minicomputer systems working in the time-sharing mode.

Of fundamental significance from the viewpoint of the future is the development of a training or further training system for teachers in which we can prepare them for changing conditions, for exploitation of the possibilities offered by informatics and for work which is substantially more independent than at present. The emphasis should be placed on the theoretical and practical foundations of information collection, evaluation, processing and communication, and teaching the instructors how to use modern informatics devices.

In the training of computer technology experts the goal continues to be the training of specialists (data analysts, operators, programmers, process organizers, etc.) who have graduated from secondary schools, naturally making use of the achievements of microelectronics and informatics.

In order that the teaching of computer technology can begin in the schools it is necessary that the teachers be taught the basic concepts of computer technology, BASIC programming and the operation of school computers. It must be made possible to teach computer technology in the institutions of higher education in order to train future teachers.

We must develop a system of general purpose programs as teaching tools to be used in the teaching of computer technology, a system which fits the educational goals and the study materials. The preparation of teaching programs should be solved with a "secondary school training program package competition." In the future, in order to proclaim such a competition, we must define the formal and substantive requirements for programs and documentation so that the program packages being prepared in many places will form a uniform system. Strict program design prescriptions are extraordinarily important. Experience shows that today it is a significant obstacle to domestic computer technology applications that the programs are being written without standard prescriptions and in most cases they cannot be used elsewhere. For this reason the authors of the programs must be called on for every new application of each program. Obviously this situation cannot continue. We must see to it that the generation growing up masters the expertise needed for program writing and uses the prescriptions pertaining to the standard.

It is an indispensable condition for the development and use of instructional program packages and for computer technology training in general that the schools be provided with computers providing the same performance and services. Thus a computer device base designed for school use will be

required for the general introduction of computer technology instruction. These computers must have a BASIC interpreter and simple graphic display possibilities.

In order to use computers as a tool in education it would be desirable if at most 3-4 students worked on one computer at one time; thus, in the more distant future, there should be at least 10-15 school computers in each school.

As of last year every school had one computer, about 200 schools have two or three, and every university, college, teacher training institute and teacher further training institution had 3-15 machines. In the meantime they have started providing computers to cultural centers.

At the request of the TII [Science Organization and Information Institute] a number of universities, colleges and institutes have undertaken to participate in the realization of the program and together with county organs they are organizing the training of teachers; later they will offer support for the use of computers also. It should be mentioned separately that universities and colleges which do not belong to our ministry, such as the Agricultural Sciences University in Godollo, the Agricultural College in Kaposvar and the Capital Pedagogical Institute, have gladly undertaken extra work for this. In the interest of the uniformity of training the Capital Pedagogical Institute has undertaken to provide its own facilities and tools for the training of instructors who will conduct the courses.

Training for instructors leading the courses was held on 20, 21 and 22 April 1983, with a 10 hour session offering practical experience for every participant. There was one computer for every two participants. The instructors leading the courses also received a number of study aids free of charge.

After the central course, computer technology training for teachers was organized in every county seat. We want to organize a study course for 1,700 teachers in 1983 and for an additional 4,000 in 1984. The courses will be organized, beginning 1 January 1984, by the National Educational Technology Center, and the thematics and study aids for this have been worked out already.

In July 1983 the TII announced an instructional program package competition, and by 31 December 1983, 200 entries had arrived; a jury commissioned by the Ministry of Culture accepted 77 of these.

The TEACHSOFT Society was orgnized earlier with the participation of the Budapest Technical University, the Kalman Kando Electric Industry Technical College, the TECHNOIMPEX Foreign Trade Enterprise and the Science Organization and Informatics Institute, with the TII organizing the work. This society has prepared the first mathematics module series. The programs can be used in both higher education and public education. In accordance with its goals the TEACHSOFT Society has begun to organize the foreign sale of these programs also. According to preliminary discussions it is expected that these programs will be sold in the United States, in several Western European countries and

in South America. Great interest in these programs has been shown domestically also and thus far a significant number of secondary schools, colleges and universities have ordered them. The TEACHSOFT Society has begun to develop programs connected with other subjects also and has put on the agenda the spread of personal computers in the training of technical experts and in both secondary and higher education.

Considering the interest being shown toward the program the Ministry of Culture, at the initiative of the TII, has agreed with the MTESZ [Federation of Technical and Scientific Associations] that the MTESZ and its associations will support this program. In the interest of this the MTESZ and the Ministry of Culture have issued an appeal. Within the framework of the MTESZ the Janos Neumann Computer Sciences Society, the Janos Bolyai Mathematics Society, the Signal Technology Association and the Budapest executive committee of the MTESZ have undertaken the leading role in support of this program; they are aiding the work with publications and by organizing conferences and exchanges of experiences.

The KISZ [Communist Youth Federation] is offering significant support for the realization of the program, partly through its organizations working in cultural institutions, partly by organizing central competitions and sponsoring the operation of computers and with organized computer technology instruction in KISZ camps.

Very good cooperation has developed with the Society for the Propagation of Scientific Knowledge, which is contributing with its own organizations to the spread of information connected with personal computers, and it has organized clubs for Young Computer Technicians.

Good cooperation has developed with the press, radio and television to discover problems arising in connection with the program, to collect information and to spread study materials and programs. The KISZ made possible the monthly publication of the "Bit-let" supplement in the journal OTLET. The Janos Neumann Computer Sciences Society is helping a great deal; it publishes a periodical titled MAGAZIN. We are contributing materially to both publications and are collecting articles suitable for publication, even obtaining experts to do the editing. The KSH [Central Statistics Office] and the Janos Neumann Computer Sciences Society have made it possible to make one page in every issue of the journal SZAMITASTECHNIKA available for computer technology instruction. We plan, on the basis of cooperation with the MTESZ, to publish articles in the MTESZ journal titled FORUM which will aid computer technology instruction. The newspaper titled TECHNIKA also publishes computer technology material on one page.

Hungarian Radio regularly broadcasts programs connected with computer technology education. The Ministry of Culture has signed an agreement with Hungarian Television to broadcast a program dealing with personal computers within the framework of its School Television transmissions.

The school computer program found a favorable reception among students and teachers. But they find computers in short supply and have mentioned initial

problems with software supply. According to our experiences they are struggling with similar problems in a number of countries of the world, even in the countries which are most developed technologically, for articles demanding a more vigorous development of computer technology education are appearing in the best known Western papers and magazines.

Comparing our situation with other industrially developed countries we can establish that we have nothing to be ashamed of. In Hungary today there is a computer for every 250 secondary school students and few countries can point to such an achievement. As an illustration we might cite an article which appeared recently in TIME which describes the situation in the United States. According to this article there are no computers in the overwhelming majority of U.S. schools even yet, and where there are there is only one for several hundred or a thousand students. Of course it is also true that this finding applies only to the supply in the schools, because there are computers in a significant proportion of families already.

Despite these favorable achievements we are only at the beginning of the work. In the next 5-8 years we must see to it that there are a significant number of machines in every school and that more and more students can get to a machine. Achieving this goal is realistic because according to experience the price of machines is falling rapidly both abroad and domestically. This is being made possible by ever more modern technologies and by increasing series size.

We trust that with the aid of the teachers there will be an increase in the number of hours of the special clubs operating in the schools, and that the children will be able to have access to the computers in the schools at any time from 8 in the morning until 8 in the evening. Naturally this will require a lot of organizing work, but seeing the efforts and broad social support thus far I feel that our hopes are realistic.

A regular and returning problem is the lack of professional books and collections of examples. Last year a number of aid books and notes were published within months but obviously these can be only a beginning. This year we must begin publication of the aids and handbooks which will make it possible for both teachers and students to master and practice the new information. We intend to provide these publications as quickly as possible in the simplest possible form.

In this work we are counting on the help of teachers and computer technicians and not least of all on the students themselves. We can count it as a very great achievement that a handbook will appear in the near future the professional text of which was written by Academician Gyorgy Marx, university professor, while the programs were written by general and secondary school children. I think that this publication will represent a turning point in the history of textbook publishing, because for the first time the students themselves have written a part of the textbook.

We have big problems in supplying the schools with computer technology training packages. This is natural for us because first we must create the

machine base for which the programs can be written. In the interest of realizing this work and for the purpose of swift implementation, and in accordance with what is contained in the school computer program, we have published a computer technology training program package competition and a number of entries have arrived--as we indicated above. Naturally we are also preparing for the exchange of simplified versions of the programs and are organizing their sale and distribution.

We have gained many favorable experiences in connection with operation of the machines. The machines have proven themselves--only 2-3 percent of them have failed. In general these were repaired within 2-3 days.

We have done public opinion research regarding the direction in which the tools should be developed. On the basis of the opinions the second version of the school computers has been modified already. This makes possible the writing of Hungarian accented characters, gives a better quality (video) picture, and the manufacturing firm has made improvements on the magnetic recording unit and the data recording procedure. Finalizing the third version of the machine is a task for the near future. Improved machines capable of doing more will be manufactured this year. It will certainly be possible to have finer graphics and color displays and later to connect line printers and floppy disk drives. But we must recognize that these extra services will increase the price of the devices, because while the price of the central part of the machine has decreased to almost half, the price of color television and printer or floppy has not moderated. It will soon be possible to acquire in Hungary 1.5 computers for the price of a printer or floppy and the price of a color TV is substantially higher than for a black and white. So we are planning to provide these more expensive technical devices for only a determined number of school computers, so that after mastering the basics the students can have contact with more complex computer technology applications and computer operating systems.

On the basis of the experience thus far the Ministry of Culture is beginning to provide personal computers for museums, archives and libraries, to aid the spread of the new culture. In the future the ministry intends to work out a separate program for the adult population. Supplying the more significant cultural centers with personal computers has begun also.

An Appeal, Signed by Bela Kopeczi, for the Ministry of Culture, and Dr Janos Toth, for the Federation of Technical and Scientific Associations:

In the interest of satisfying the needs dictated by the development and wide spread of computer technology culture a program has been started to introduce school computers into secondary education. This many-sided program can be effective only with cooperation on a social scale. The extent and complexity of the program requires that the 32 scientific associations and 19 county and Budapest organizations of the MTESZ turn special attention to the computer technology education of the generation growing up and to aiding this education. For this reason, the Federation of Technical and Scientific Associations and the Ministry of Culture request, in the interest of social aid for the school computer program, that the member associations of the MTESZ and their members support the realization of this important program.

The forms of support can be:

--providing consultation for secondary school teachers;

--creating direct contacts between schools, research institutes, enterprises and higher education institutions in the interest of aiding the computer technology instruction taking place in the schools (by preparing training program packages, collections of computer technology examples and methodological compilations);

--providing material support for acquisition of a school computer;

--organizing programs to demonstrate computer technology applications (exhibits, study courses, competitions, seminars, computer technology days, conferences);

--professional support in preparing and for the work of computer technology camps and specialized construction camps;

--supporting secondary school computer technology competitions and clubs and aiding their participants;

--having the themes of the program featured in technical-economic weeks or days and other MTESZ or association programs.

The Federation of Technical and Scientific Associations and the Ministry of Culture ask the Janos Neumann Computer Sciences Society to bring together and coordinate--in the member associations and regional and Budapest organizations of the MTESZ--initiatives serving to support the school computer program.

Budapest, 2 September 1983.

Description of HT 1080Z School Computer:

Manufacturer: The Signal Technology Cooperative. Display: 16 lines of 64 characters. Graphics: The graphics must be redesigned because of diverse coordinate assignments (among other things). There is no separate graphics mode. A 6 x 2 point figure per character is in an 8 bit supplementary part of the code table (between dec 128 and 181). One can draw only with the CHR curve. Can be found in dec code 128-159 and 160-191. Point graphics: 48 lines by 128 columns; 48 lines by 64 columns for a half picture (then the picture element is square). BASIC: An instruction line with a maximum of 255 characters. GOTO can be used as a command also. Automatic line numbering. Line filling without EDIT, grouped also.

Historical Review

The first proposal to begin computer technology instruction was made in 1979. Two years later the State Planning Committee approved a plan for computer technology instruction within the framework of the central computer technology development program and in the same year the Science Organization and

Informatics Institute ordered 112 of the ABC 80 computers of Swedish manufacture. In April of 1982 a jury appointed by the Ministry of Culture recommended--on the basis of a competition--purchasing of the HT 1080Z computer of the Signal Technology Cooperative.

Implementation of the school computer program began in the fall of 1982. In February 1983 the Signal Technology Cooperative delivered 779 of the HT 1080Z computers. The KISZ and the Ministry of Culture extended their computer technology patronage to the teaching of computer technology in secondary schools. In the spring of this year the Science Organization and Informatics Institute, with the cooperation of the Capital Pedagogical Institute and the Lorand Eotvos Science University, trained study course leaders and prepared the necessary notes. At the same time distribution of the ABC 80 computers began with the cooperation of the Kalman Kando Electric Industry Technical College.

In May-June 1983 the study course lecturers trained earlier organized training for 1,700 teachers in the county seats, with the aid of county further training institutions and universities, colleges and institutions working in the county seats. At the end of the courses the schools took over and began operation of the computers and the Science Organization and Informatics Institute published a competition for instructional program packages. Student club work began in the schools in September.

In October 1983 the Science Policy Committee approved continuation of the school computer program and provided separate material support for it. Also in this month it was agreed that the School Television would broadcast a regular program for training in computer technology. In December the Science Organization and Informatics Institute took over another 600 (modified version) HT 1080Z computers from the Signal Technology Cooperative; these will be distributed in the counties by the end of February 1984.

Program's Future

The secondary schools will get additional computers this year and the equipping of general schools will begin on an experimental basis. On the basis of earlier favorable experiences the more significant cultural centers will get computers also. The Science Organization and Informatics Institute will provide Commodore 64 computers to a few secondary schools offering outstanding achievements. Books and collections of examples supporting the school computer program will appear and the copying of the accepted instructional program packages will begin for the schools. Public personal computer labs will open in a number of places so that an ever broader sphere of the populace can become acquainted with the machines. The institutions of higher education will begin to be provided with professional personal computers to go with the mini and large computers provided earlier. Institutions training teachers and the county further training institutions will get additional school computers.

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FIBER-OPTICS SYMPOSIUM, SCIENTIFIC AGREEMENT DESCRIBED

Application of Fiber Optics

Warsaw NAUKA POLSKA in Polish No 3-4, Mar-Apr 83 pp 215-217

[Article by Ryszard Romaniuk, Section of Optical Electronics, Telecommunications Electronics Committee, Polish Academy of Science [PAN]:
"The Third National Symposium of the PAN, 'Fiber-Optics and Their Applications' (Jablonna, Feb 15-17, 1983)"]

[Text] On Feb 15-17, 1983, the Third National Symposium, "Fiber-Optics and Their Applications," was held at the PAN House of Congresses and Conferences at Jablonna near Warsaw. The symposium was organized by: the Electronics and Telecommunications Committee of the PAN (Optical Electronics Section), the Institute of Communications and the Warsaw Polytechnic. It was personally sponsored by the Minister of Communications, Professor Wladyslaw Majewski; the scientific committee of the symposium was chaired by regular member of the PAN Adam Smolinski.

The main goal of the symposium was to provide to Polish participants information on the latest world developments in fiber-optics technology, namely, the technology of their production and fiber-optics telecommunications, and to take stock of achievements in this field attained in Poland over the last several years. More than 250 Polish participants and 20 visitors from France, Italy, Finland, the GDR, the United States, the FRG, Japan, Britain and Czechoslovakia attended the meeting. Foreign scientists took active part in the symposium, presenting papers on the development of fiber-optics technology in their respective nations. More than 150 communications by Polish scientists represented as posters and discussed in several overview presentations were in evidence. These communications described the work of Polish scientists in the following subject areas:

--fiber-optics in telecommunications;

--fiber-optics: technology, theory and measurement;

--sources and detectors for fiber-optics technology;

--receiving fiber-optics elements: couplings, connections, switches and pick-ups;

--integrated optical electronics: theory, technology and laboratory experiments; and

--applications of fiber-optics technology: in science, industry and biomedicine.

The symposium was opened by the regular member of the PAN Adam Smolinski, who gave a brief historical overview of the preceding two symposia. The first of these was also held at Jablonna in February of 1976 and initiated the development of fiber-optics technology in Poland. Professor Smolinski noted the timeliness of the decision of the Electrons and Telecommunications Committee of the PAN of 1975 concerning the organization of periodic symposia on this subject, because they have proven themselves as providing incentives to development of new fields of optical electronics in the country. The next speaker was regular member of the PAN Bohdan Paszkowski, Chairman of the PAN's Electronics and Telecommunications Committee, who was followed by Professor Wladyslaw Majewski, Minister of Communications. Professor Paszkowski said that the third symposium already came as a forum for reporting on the specific research and development and even technological achievements of Polish science and numerous research and industrial institutions. He mentioned other events organized by the Electronics and Telecommunications Committee in the interval between the second and third Jablonna symposia: the First Symposium on Fiber-Optics Measurement Technology (Lublin, June 1981) and the "Non-Telecommunications Fiber-Optics" Symposium (Bialowieza, September 1982). Professor Majewski read a brief paper on modern telecommunications problems and described the role of fiber-optics technology in this framework. The opening session was concluded by a paper read by one of the founders of fiber-optics technology in the world, Professor William A. Gambling of Southampton University, entitled "Development and Prospects for Optical Communications."

During the course of the symposium, the following papers were read:

--B. Chiron (Thomson-CSF, Paris), "Optical Fiber Communications Systems";

--M. Niquil (SAT Cable Division, Paris), "The Wired City of Biarritz and the Development of Fiber Optics in France";

--Dr. M. Treneux (CNET, Lannion), "New Developments in Optical Communication in France";

--Dr. B. Costa (CSELT, Torino), "Progress in Fiber-Optics Communications Research in Italy";

--Professor T. Okoshi (University of Tokyo), "Heterodyne and Coherent Fiber-Optic Communications";

--Dr. M.H. Reeve (British Telecom, Ipswich), "Cabling Aspects of Monomode Optical Fiber Systems";

--Dr. H. Bose (Institut für Nachrichtentechnik, Dresden), "First Fiber-Optic System Installed in the Public Network of Deutsche Post";

--Dr. D. Schilder (Humbold Universität, Berlin), "Frequency Division Multiplex in an Optical Fiber Local Distribution System";

--Professor L. Bonavoglia (Scuola Superiore Guigliemo Reiss Romoli SPA, Coppito), "Teaching of Optical Fiber Communication Systems";

--Dr. A. B. Sharma(Helsinki University of Technology), "Factors Affecting the Interlaboratory Repeatability of Multimode Fiber Attenuation Measurements";

--Dr. D. Moutonnet (CNET, Lannion), "Refractive Index Profiles in Single Mode Preforms and Fibers";

--Professor A. Schlachetzky (Technical University of Braunschweig), "Properties and Technologies of InGaAsP in View of Optical Communication Applications";

--Dr. B. de Cremoux (Thomson-CSF, Domaine de Corbeville), "Quantum Well Lasers";

--Dr. M. Papuchon (Thomson-CSF, Domaine de Corbeville), "Integrated Optics and Its Recent Applications";

--K. Lambrecht (CRL Laurel Industries, USA), "Emerging Applications of Fiber-Optics";

--Dr. R. Falciai (IROE, Firenze), "Radiation Characteristics of Tapered Dielectric Waveguides";

--Dr. M. Brenchi (IROE, Firenze), "Multimode Optical Fiber Sensors"; and

--Professor K. Thiesen (Zentral Institut für Optik und Spectroscopie, Berlin), "Thin Film Electroluminescence for Information Display." The paper was read at ITE CEMI on Feb 18, 1983.

The communications were presented at the symposium during the course of three poster sessions, each continuing for a few hours every day. On the first day of the symposium, the poster session covered telecommunications and fiber-optics under technological, theoretic and measurement aspects. The second day was dedicated to active elements for light waveguide technologies and integrated optical electronics. The focus of the third day was on receiving elements for fiber-optics technology and its applications. Numerically, the communications were distributed equally between these three groups, each containing approximately 50 communications. Before the beginning of each of the three poster sessions, a plenary session was held as an introduction to the sessions. The introductory portion provided a brief overview of the materials presented and a discussion of the development trends in the fiber-optics field of concern.

The first poster session covered the following major aspects:

--in the telecommunications part, a description of the fiber-optics transmission system brought into operation in 1982 in Lodz, a description of a multichannel transmission system with wave distribution and experimental fiber-optics systems of a capacity of 8 Mbit/s;

--in the technological part, a description of PCS (polymer-clad silica) and PACVD (plasma-activated chemical vapor deposition) technologies recently mastered by workers at the Marie Curie Sklodowska University in Lublin, phase separation and the work on the multilayer and shaped crucible fibers conducted at the recently organized Light Waveguide Research and Production Section of the Bialystok Glass Factory, as well as a description of the section's production profile;

--in the measurement field, the composition of instruments for diagnosis of light waveguide optical fiber and cable preforms, including two laboratory installations for light waveguide measurement by the method of backscattering.

At the second poster session, numerous works were presented on active elements of light waveguide technology, especially elements intended for operation in the so-called longwave transmission window, $\lambda \gtrsim 1.3$ μm, and which are prepared of InGaAsP. Nearly 25 communications were presented in the field of integrated optical electronics, including such subjects as the technology of planar waveguides, numerical solutions of the modal structure of nonuniform light waveguides and observations and measurements of basic waveguide effects.

The third poster session was mainly concerned with fiber-optic technology. More than 40 communications were presented in this area. The remaining communications dealt with light waveguide couplings and connections and a new area of light waveguide converters used for measurement of mechanical, thermal, chemical, electrodynamic, radiational and other values. Several dozen fiber-optic and local transmission systems (so-called object systems) have been described that are being used at research laboratories, especially in medicine and biology. Of the more interesting developments, one can mention the laser-light waveguide equipment for ophthalmologic surgery, a fiber-optic system of fire safety units in an industrial environment, fiber-optic remote information system for a coal mine, etc.

The symposium proceedings will be contained in five volumes, two of which have been already printed before the symposium. The two volumes contain communications by Polish authors. The third volume will present papers received by the proceedings' editors by the opening date of the symposium and introductory papers to poster sessions. The fourth volume will contain papers read by foreign guests. The fifth volume will be a compendium of abstracts of symposium proceedings and will be published in English. The third and fifth volumes are planned to appear before the end of 1983

and the fourth volume in 1984. The total size of the proceedings will be more than 90 printers' signatures. The symposium proceedings are available from the Institute of Communications in Warsaw.

The Third Fiber-Optics Symposium has fulfilled its function. Its participants came to the conclusion that the development of fiber-optics technology in Poland is indispensable. Fiber-optics technology allows economical solutions of various problems, especially in telecommunications in the broad sense of the word. This technology is developing at a rapid pace in the world, which requires constant and active monitoring of these developments and the training of personnel for introduction of this technology in Poland. This function is partly met by the Fiber-Optics Symposium. The next symposium of this cycle is planned to be held in 1986. The results of the current symposium will be evaluated in detail by the Electronics and Telecommunications Committee of the PAN, which will work out the specific recommendations concerning the further development of fiber-optics technology in the country.

Polish-French Scientific Cooperation

Warsaw NAUKA POLSKA in Polish No 3-4, Mar-Apr 83 pp 219-220

[Article by MB, Bureau of Foreign Scientific Contacts of the PAN: "An Agreement on Scientific Cooperation"]

[Text] On Feb 4-8, 1983, a delegation of the PAN, led by its chairman, regular member of the PAN, A. Gieysztor, visited in France on the invitation of the Academy of Science of the French Institute. Among members of the delegation was also the Deputy Learned Secretary of the PAN, regular member of the PAN, M. Nalecz.

After negotiations, Professor Dr. Gieysztor, Chairman of the PAN, and Professor J. Bernard, Chairman of the Academy of Science of the French Institute, signed on Feb 8, 1983, in Paris a "Joint Declaration of the Polish Academy of Science and the Academy of Science of the French Institute."

The joint declaration provides for cooperation in areas that would benefit both academies, such as mathematics, physics, chemistry, cell and molecular biology, animal and plant biology, human biology and medical and earth sciences. The cooperation will be based on: visits of researchers and joint seminars, visits and lectures by scientists and other bilateral and international scientific meetings. The declaration contains decisions on conducting regular scientific publication exchanges, reciprocal exchanges of information on development of science, its practical applications and the influence of science on national life. It has been also decided to promote scientists' contacts with other scientific communities. The appendix to the declaration states that in 1983-84 personal exchanges will be limited to one or two individuals annually from each side.

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The French Academy of Science was founded in 1666. The agreement on cooperation with the PAN is its first agreement with a foreign institution concluded by the Academy in the 300 years of its existence. The Academy of Science is one of five entities — the French Academy, the Humanistic Academy, the Academy of Fine Arts and the Academy of Ethical and Political Sciences-- that constitute the French Institute.

The Institute is primarily concerned with the following: organizing scientific meetings of the members of individual academies, reviewing the major scientific projects both in France and abroad, offering its opinions on the envisaged reforms in the field of science, discussion of information on new developments in science, expressing its opinions on so-called new research trends and new research methods and also election of new members and other internal affairs of the Institute.

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On Jan 7, 1983 in Paris, Professor Dr. L. Kasprzyk, Director of the Scientific Station of the PAN, and P. Papon, the General Director, and C. Frejecques, President of the National Center of Scientific Research of France (CNRS), signed, upon the approval of the Polish Academy of Science, the protocol on cooperation between the PAN and CNRS for 1983-84.

During the course of negotiations, it was noted that the cooperation so far between the institutes of the PAN and CNRS has attained major results, some of them through higher forms of cooperation such as joint research projects, distribution of assignment functions, etc.

During the course of negotiations, the Program of Cooperative Research for 1983-84 was drafted, which covers 24 research projects--namely: the nervous system, molecular biology; catalysis and adsorption; thermodynamics and calorimetry; studies of solid state electron properties and structures; problems of the physics of the earth's interior and geodynamics; problems of modern mathematics and numerical methods; the dynamics of the sea and inland waters; mechanics of solids, liquids and gases; comparative studies of law; studies of Slavic languages. On the Polish side, 42 institutes, including 6 ministerial institutes, will participate in the program.

Cooperation in joint publication projects has been discussed, and it was decided that it should be supported. Specifically, this concerns publication of the second and third volumes of the Collected Works by Copernicus. It was also decided to continue cooperation and exchange in scientific and technical information and documentation, specifically between the Science Information Center of the PAN and the Documentation Center of the CNRS.

During the course of negotiations, the organizational and financial terms of cooperation were also settled.

9922
CSO: 2602/13

MICROCOMPUTER PRODUCTION OF FOREIGN POLONIA FIRMS DESCRIBED

Warsaw INFORMATYKA in Polish No 9, Sep 83 pp 29-32

[Article by Janusz Zalewski: "55th Poznan International Trade Fair; Foreign-Polonia Computer Firms"]

[Text] It was with interest that I went to Poznan where the foreign-Polonia firms were to conduct a microcomputer offensive. This offensive had already been forecast at last year's fair.[1] And the first trade stalls we saw confirmed these expectations.

The Marco Electronics firm from Krakow showed an MUX 04+ multiplexer for the Apple II microcomputer, which uses a type 8085A microprocessor. With the four additional asynchronous transmission channels thus obtained, applying a V24 standard, it is possible to produce, using this microcomputer, a 5-terminal multi-access system. The multiplexer serves as an expanded processor performing all of the functions connected with transmission (maximum transmission rate, 4,800 baud). For the microcomputer it is also an additional RAM-type memory, with a 256-byte capacity. There is a buffer of this capacity for each of the four additional terminals (Phot. 1 [photographs not reproduced]). A DOS operating system is used, with its own multi-user modifications.

It can also be expanded by using an M-20/60 converter, adapting data transmission equipment, V24 standard, to 20 or 60 mA power strip requirements, thus increasing transmission range to 10 km. This firm's leading product is a 32-channel multiplexer, giving the terminals or other asynchronous equipment, compatible with V24 standard, joint access to a transmission data channel. Transmission time is allocated only to active terminals. ASP protocol (Addressing Serial Protocol) must be used, which is a modified DDCMP protocol used by the DEC firm. The modular construction of the equipment makes it possible to easily expand the configuration to 32 channels.

Overall, the products of this firm offer great potential in the automation of of office work.

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[1] J. Zebrowski, "54th Poznan International Trade Fair Microprocessor Invasion", INFORMATYKA, No 7, 1982, p 28.

But if the Marco Electronics firm did not advertise a computer, in another stall a computer without a firm advertised itself. It turned out that a group of young designers developed a microcomputer ready for serial production (full documentation) and was looking for a sponsor. Their brainchild is a personal computer named AGAT, which uses a Z80A processor, with an addressing memory space of up to 1 M bytes (by means of a memory management system). Almost all of the peripherals applicable to this class of equipment can be hooked up to the computer, using control units--peripheral equipment such as a video monitor (CRT 8275), a floppy disk station, a PK-1 memory cassette, perforator, paper tape reader, printer, modem, and analogue equipment. It is also possible to hook up a graphics controller (1024 X 1024 points) and several terminals. At present the computer can operate using CP/M and ISIS operating systems. It is expected that it will have its own operating system with BASIC language. The microcomputer can be used mainly in industrial and scientific-research laboratories and workshops. That is why the so-called objective input/output and user software will be produced to individual orders.

A modem which uses a modular construction, making it possible to establish complex terminal hookups with the computer, is very interesting. Thus far the following modules have been designed: feeder, transmitter, receiver and control unit, and others are expected, e.g., to operate in conjunction with a telephone, teletype, telephone line, etc. Transmission is synchronous at a rate of 1,200 or 2,400 bits. The computer's producers are sure that its price will be competitive not only in relation to products manufactured by state firms, but also with the Polonia firms.

A personal computer with which the readers of INFORMATYKA[2] are already familiar is the ZX81, assembled and sold in Poland by the AMERPROD company in Poland, also described in a current issue in J. Karczmarczuk's article. It should be mentioned that designers from this company are working on a microcomputer which will have more functions. The microcomputer, called K-100P, will be equipped with a keyboard, graphics, analogue input/output, etc. It seems that due to the relatively low cost of their products and bulk sales, the company has already established a position on the Polish market and is even beginning to publish a ZX81 users' bulletin.

But the ZX81 is a toy in comparison with the CS-80 microcomputer manufactured by the COMPUTEX company. This is a modular system which uses a ZX80A microprocessor, designed for industrial-laboratory, design-office, and typical analytical applications. Thus far a number of packages have been designed, including central unit packages differing according to memory capacity, video monitor control units (24 X 40 or 24 X 80 characters), graphics control units (512 X 256 points), digital and analogue input/output packages, and floppy disk control unit.

Software appears in three versions, differing according to information carrier: paper tape, magnetic tape (PK-1 memory cassette), and floppy disk (SP45DE station). A system with a 5-inch diskette is also being developed. Each software system contains a MAGOS operating system, a BASIC language interpreter, and a

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[2] J. Dawidowski, "Personal Computer ZX81", INFORMATYKA, No 5, 1983, p 21.

DEBUGGER debugging system (compatible with Intel's standard). MAGOS is modeled on the CP/M operating system and resides in EPROM memory occupying about 6 KB address space. The system's basic orders include LIST, KILL, PRINT, STORE, NAME, LOAD and EXEC, the words reflecting the functions. If the customer desires, MAGOS is supplied in a form that is completely compatible with the CP/M system. The basic programming language, CONTROL-BASIC, is a fast interpreter, uses BASIC storage, and is directed at real-time operation. It can be used for multi-task work due to such instructions as TASK, ACTIVATE, TURNON, WAIT, DISMISS, CLOCK, etc., and exchange of information between tasks occurs only through joint memory.

Equally universal is the MSM microprocessor modular system manufactured by the IMPOL 1 company, which makes it possible to produce measurement-control, analytical, and office computer configurations. Central units use I-8080A, I-8085A or Z80A microprocessors. The modules in the configuration are connected by a BUSMAT main circuit board (described in detail in the catalogue), by which it is possible to do multi-processor work, address 1 MB of memory, and send 10 signals of interruptions. The size of the packs conforms with a single eurocard, equipped with 64-contact intermediate connections. The large selection of modules includes cassette and diskette memory control units, a screen monitor, series and parallel digital input/output systems, and analogue systems. The possibility of expanding the main circuit and adding another cassette is interesting.

There is software for a simple monitor, a minimal MOPS operating system or a DOPS diskette operating system, compatible with ISIS II, and BASIC and KAMIL language interpreters for sequential control (data on storage is lacking).

Another group from this same firm has developed an MSK-1 modular computer system, also based structurally on the eurocard (220 X 233.4 mm), designed for large-scale automation in industry, medicine, commercial trade, etc. The main circuit board, which comprises the printed connection for the data, address, control and feed bus, uses the upper connections of each module (ELTRA 811/812). The lower connections are used according to the function of each module. The central unit, based on the Intel 8080 family, contains 6 K bytes of EPROM memory and 2 K bytes of RAM memory. Already developed, or under development, are control units for typical peripherals produced in Poland, such as the DT 105 perforator, the CT 220 reader, the DZM-180 printer, the PK-2 cassette memory, and a diskette memory from KFAP, and also analogue and digital input-output systems. Software, supplied in EPROM memory, on perforated or magnetic tape, covers the monitor, debugger, text editor, assembler and disassembler, and EPROM programmer.

The IMPOL II firm showed IMP-85 and IMZ-80 microcomputers which use Intel 8085A and Z80 processors, respectively, with a 64 KB operating memory. The configurations are or can be equipped with a video monitor, 1 or 2 floppy disk units, a DZM-180 printer, and other peripherals. Software covers the IMPS operating system compatible with CP/M and BASIC and other languages operating under the CP/M system, and also basic instrument software.

* * *

List of Foreign-Polonia Microcomputer Firms [Key on following page]

(1) Nazwa mikrokomputera	(2) Dostawca	(3) Procesor	(4) Pojemn. pamięci (obszar adres.)	(5) Sterowniki urządzeń zewnętrznych	(6) Magistrala	(7) Wymiar płytek (mm)	(8) Złącza magistrali	(9) Oprogramowanie	(10) Ceny (zł)	(11) Poziom informacji (1—5)
1) [see below]	MARCO ELECTRONIC Balicka 176-100 30-149 Kraków	I-8080A	to do 64KB	wszystkie typowe (12) + multiplekser asynchron.						(2,5)
AGAT	2) [see below]	Z80A-4 MHz	to do 0,5 MB (1 MB)	dyski elast. monitor kol. V24 PK-1 (13) we-wy anal.	specjalna (14)	100 × ×160		Zgodne z CP/M i ISIS przewidywany własny syst. oper. i BASIC (15)		2
ZX-81	AMEPROD Kmieca 20a 61-632 Poznań	Z80A-3,25 MHz	to do 64KB	klawiatura membranowa, monitor drukarka (16) magnetofon				BASIC	228 000 (64 KB + druk.) (17)	3
CS-80	COMPUTEX Skrońskiego 7 02-466 Warsaw	Z80 Z80A	EPROM to do 8 KB: dRAM to do 64KB	monitor ekr. dyski elast. we-wy cyfr. we-wy anal. (18) monitor graf.	zunifikowana (19)	100 × ×240	64 stykowe (20)	sys. op. MAGOS Control BASIC DEBUGGER	250 000 (MAGOS)	4
MSM	IMPOL Malawskiego 7 02-641 Warsaw	I-8080A I-8085A Z80A	EPROM to do 16KB: sRam-to do 16KB	PLx45D PK-1 monitor ekr. (21) we-wy anal. we-wy cyfr.	BUSMAT	100 × ×160	pośrednie 64 st. CANNON (22)	monitor sys. op. MOPS BASIC KAMIL sys. op. DOPS 3)	30 000 59 000 90 000 93 000 159 000 150 000 + K10000	4
MSK-1	IMPOL I Malawskiego 7 02-641 Warsaw	INTEL 8080	EPROM to do 16KB: dRAM to do 64KB	DT-105 CT2200 DZM 180 dyski elast. (23) we-wy cyfr. we-wy anal.	drukowana (24)	220 × ×223,4	811/821 ELTRA	monitor + debugger edytor tek. (25) makroasemb. disasembler 3) [see below]	47 000 42 000 75 000 42 000 178 000 + K10000	3,5
IMZ-80	IMPOL II Filona 16 02-658 Warsaw	Z80	to do 64KB	monitor ekr. magnetofon (26) DZM 180 PL-45D PK-1				BASIC asembler edytor (27) debugger		2
IMP-85	IMPOL II Filona 16 02-658 Warsaw	INTEL 8085A	to do 64KB	monitor ekr. (28) PLx45D DZM 180 V24				sys. op. IMPS BASIC 80 FORTRAN80 makroasemb. (29)		2

1) Supplier has full particulars. 2) Obtain information from DEKOR, Forteczna 11, 01-540 Warsaw. 3) Processor + RAM.

As this discussion has shown, the offer of the foreign Polonia firms is quite impressive. But there is no certainty as to how long it will be current. Although the invasion of microprocessors is still continuing, it seems to be directed more at apparatus than at customers. Admittedly, most configurations are attractive, from the standpoint of price as well as technical potential. Unfortunately, I did not see any documentation, but this is doubtless a universal weakness.

The foreign Polonia firms are certainly a desirable element on the Polish computer market, filling a definite production gap, and the momentum of some of them (IMPOL, for example), suggests that they will become a permanent part of this market. In any case, some microcomputers, for example, CS-80, MSK, and MSK, equipped with already available special equipment, can compete successfully as debugging configurations with the auxiliary configurations described in INFORMATYKA's first issue this year.

[Key for table on preceding page]

Key:

1. Microcomputer designation
2. Supplier
3. Processor
4. Memory capacity (address space)
5. Peripherals controllers
6. Main circuit board
7. Disk size (mm)
8. Main circuit connections
9. Software
10. Prices (zlotys)
11. Level of information
12. All typical plus asynchronous multiplexer
13. Floppy disk, color monitor, V24, PK-1, analogue input/output
14. Special
15. Compatible with CP/M and ISIS; own operating system and BASIC anticipated
16. Membrane keyboard, monitor, printer, tape recorder
17. + Printer
18. Screen monitor, floppy disk, digital and analogue input/output, graphics monitor
19. Integrated
20. 64-contact
21. Screen monitor, analogue and digital input/output
22. Intermediate 64-contact
23. Floppy disk, digital and analogue input/output
24. Printed
25. Text editor, macroassembler, disassembler
26. Screen monitor, tape recorder
27. Assembler, editor
28. Screen monitor
29. Macroassembler

9295
CSO: 2602/14

DEVELOPMENT, PRODUCTION OF DEEP-WATER SUBMERSIBLES OUTLINED

New Deep-Water Submersible

Warsaw RZECZPOSPOLITA in Polish 4 Jan 84 p 4

[Article: "Deep-Water Submersible from Warski Shipyards: Cooperation of Experts, Production Plans for New Equipment"]

[Text] The Warski Shipyards in Szczecin are the sole producer of research deep-water submersibles in the socialist countries and one of a very few such producers in the world. These submersibles allow people to work at depths of a quarter of a kilometer below the surface of the water.

The submersibles constructed in Szczecin consist of decompression chambers and a diving bell. In the chamber the crew prepares to exit under water, or after returning from the deep the body adapts to normal pressure. The diving bell is used to release people at a depth where the pressure even reaches 25 atmospheres. The special apparatus prepares the divers a mixtures of gases to breathe under these conditions. It supplies oxygen and helium at the right temperature and humidity and warns of possible dangers. The entire apparatus is linked up by complex steering and communications systems which can be located either on a ship or on land, if the system is permanently installed there. The submersible's chief designer is Mgr Eng Marian Kuklinski.

The work on getting the design ready and moving into production took 4 years. Alongside the group of specialists from the Szczecin shipyards, a number of institutions of higher education also participated: Szczecin Polytechnic, Gdansk Polytechnic, Pomeranian Medical Academy in Szczecin, Military Medical Academy, the naval academy, and several other units. Up to the present time the Warski Shipyard has already built three deep-water submersibles on order from the Soviet Academy of Sciences. Two are working on research ships built in Szczecin, the Witjaz and the Akademik Niesmiejanow. The third serves as a land base to prepare the academy's aquanauts to work at great depths in the sea. The base installed in Vladivostok also has a special water tank to simulate the conditions under the water at various specified depths as well as a medical set-up to test the human body working at pressures over 20 atmospheres.

On the basis of the experience it has already acquired, the Szczecin Shipyard is building a medical pressure chamber for the Marine and Tropical Medicine

in Gdynia, the center is mainly to help in the treatment of cassion disease and in oxygen therapy. The shipyard's plans also include units for diving even to depths twice that of which those built in the past are capable. The Soviet Union, for example, is interested in such equipment.

Operation of Geonur II Bathyscaphe

Warsaw KURIER POLSKI in Polish 26 Jul 83 p 1

[Article by W. Swiecicki: "Geonur II in Action: First Jump Into Water 50 Meters Deep, What Secrets Lie at the Bottom of Lawica Slupska? Famous Gustlaf Wreck Awaits Explorers"]

[Text] The first expedition with the new Geonur II bathyscaphe left the Polish Ship Rescue base in Gdynia without publicity and even in secret. The underwater vessel designed by Antoni Debski and constructed last year by the Komuna Paryska Shipyards in Gdynia is now operating in the Baltic on a trial run following many shipyard tests. The current venture is technical in nature.

The Society of Friends of the Earth Sciences, which owns the bathyscaphe, adapted among other things to submarine drilling on the sea floor, has the assigment of examining small-chip sediment at the bottom of Lawica Slupska about 40 kilometers offshore.

For 3 weeks the vessel will undergo tests and have all its operating features checked, especially moving underwater, dragging the depths, and drilling on the bottom. Drilling equipment in a movable chamber is the most important component of the three-chamber bathyscaphe.

The tug Koral, commanded by Cpt Tadeusz Jedrzejkiewicz, had the Geonur II in tow and brought it to Lawica Slupska and is providing it security. The underwater search team total 15 persons.

The drilling exploration work is already being conducted at a depth of about 20 meters, but the Geonur II will submerge to a depth of 50 meters on trials conducted during the expedition.

The bathyscaphe's design is adapted to move at two knots to a depth of 150 meters and to conduct drilling at 80 meters.

It will be interesting to see during this expedition whether the Geonur II crew finds some unknown wrecks or other secrets from the depths of Lawica Slupska. As we know the wreck of the famous Gustlaf, which sank in 1945 with several thousand soldiers and German citizens being evacuated from Gdynia then, is down there.

Bathyscaphe Underwater Probe

Warsaw RZECZPOSPOLITA in Polish 17 Aug 83 pp 1, 2

[Article: "Geonur II Returns From Expedition: Drilling Deposits in Lawica Slupska"]

[Text] After a 3-week experimental technical-operations expedition, the bathyscaphe Geonur II has returned to Gdynia from the Lawice Slupska. This is a multipurpose vessel belonging to the Pomeranian division of the Polish Society of Friends of the Earth in Gdansk. It is designed to conduct underwater research. It remained in the shallow middle of the Baltic near the Koral, which rendered it tug services.

Along with its eight-member crew of divers and skin-divers directed by Antoni Debski, the first Polish bathynaut and designer of bathyscaphes, the Geonur II was carrying out a charge from the Marine Geology Institute in Sopot to determine the gravel deposits found in the Lawica Slupska, because they are to be extracted for our construction needs on an industrial scale, and Polish underwater specialists are to do the job.

The bathyscaphe is fitted with pneumatically operated drilling shafts. It can drill at depths of up to 80 meters.

The expedition also tested various structures at the bottom at depths of 18 to 25 meters. The Geonur II will return to the Lawica Slupska area.

Successful Bathyscaphe Operation

Warsaw TRYBUNA LUDU in Polish 17 Aug 83 p 1

[Article: "Geonur II Probes Baltic Depths"]

[Text] (From our own sources) The new Polish bathyscaphe Geonur II, built after Antoni Debski's design at the Komuna Paryska Shipyards, has returned to Gdynia from its first trip to the Baltic depths. The original equipment, designed for making various sorts of underwater missions, was used for geological exploration of the deposits of building gravel of Lawica Slupska, during its 3-week voyage.

The new bathyscaphe proved itself operationally in every respect.

10790
CSO: 2602/6

SCIENTIFIC APPLICATIONS FOR ECONOMIC PURPOSES DESCRIBED

New Technology for Industry

Warsaw RZECZPOSPOLITA in Polish 2 Feb 84 pp 1, 2

[Article by Krystyna Borowicz: "Scientific Thought Will Help Industry"]

[Text] Will necessity finally become the mother of invention? Everything points to the fact that it will. The Central Annual Plan for 1984 gives a list of the original technical solutions which will be applied and disseminated within the framework of government orders. Admittedly this is a modest selection, because it is limited to only 19 inventions, but then our investment resources are also very limited.

The authors of the Central Annual Plan (CPR) decided that the following socio-economic needs had priority: food, housing construction, health and environmental protection, economy in raw materials, fuels and energy, export and efficiency improvements in import. Innovations in these areas will promote further economic development.

New feed additives will enhance the food economy. One of them, developed at the Central School of Agriculture, Agricultural Academy (SGGW-AR), jointly with the Wieliczka salt mine, is intended for the raising of broilers and hogs. It will be disseminated in all state and cooperative agricultural enterprises, within the framework of government orders. Pilot production has been begun in the Wieliczka salt mine.

In the Wroclaw Agricultural Academy, Prof Stanislaw Zaleski's group developed a method for solidifying animal blood. The new preparation, made from slaughter blood, will add protein to feeds and to delicatessen products.

Helicoidal heat exchangers, developed in the "Instal" Installation Techniques Main Research and Development Center, will help to modernize the tremendously materials-intensive housing construction industry. The application of this invention to this industry will make it possible to save 24,000 tons of steel over a period of a year and large amounts of insulation materials. At the same time, energy losses will be lower. The antiquated JAD [expansion unknown] heat exchangers produced thus far from imported steels will be eliminated. In the

opinion of the authors, about a billion zlotys a year will be saved when this invention is put into general use.

A nonfusion method of producing waterproof roofing material is the original invention of some ordinary workers in the Housing and Repair Management Board in Warsaw. Roofing material made by this method is five times more durable than tar paper. One roof covering can be used almost 50 years. Use of this invention by the construction industry would result in savings of materials in short supply, on condition that the Krosno Glassworks expands production of glass mat and develops the necessary chemical agents, such as binders, in place of those now being imported.

The original--throughout the world--method of processing hog bile for pharmaceutical needs was developed by scientists in the Pharmaceutical Industry Institute. To fulfill government orders, the Rzeszow Pharmaceutical Factories POLFA will produce 10 kilograms of this preparation this year so that indispensable pharmacological and clinical research can be conducted and it will also develop the technical and economic assumptions for a semi-technical installation. This is not a small invention: the use of 300 tons of hog bile will make it possible to produce hormonal medicines valued at 340 million zlotys (by 1981 prices). The foreign counterparts of these medicines are estimated to cost 14.7 million dollars.

Our energy-intensiveness is double and our steel-intensiveness is triple, in terms of a unit of national income, that of the leading European countries. In addition to economies, investments in this area are also essential.

As part of government orders, the authors of the Central Annual Plan anticipate that the Lenin Steelworks will begin production of sheet metal and strip in a new grade of steel which is highly resistant to corrosion. This is the achievement of specialists in the Zeran Motor Plant. The plant will produce auto mufflers. Muffler life will increase from 30,000 kilometers to 200,000 kilometers. Operation tests were successful.

In the Ferrous Metallurgy Institute in Gliwice equipment has been developed for the production of shaped wire. It is protected by three patents. Application of this invention in the Dabrowa Gornicza-Slawkow Metal Works resulted in savings of approximately 25 million zlotys. When the invention is fully utilized, according to the specialists, 12,000 tons of materials, costing 400 to 800 million zlotys, depending on the diameter of the wire, will be saved annually. Further production of this equipment is planned as part of a government order. The Wire and Wire Products Factory in Radom and in Gliwice and other plants which produce nails and wire are waiting for this equipment.

A wire-in-tube precipitator, the invention of the CHEMADEX Design and Delivery of Complete Industrial Facilities Enterprise, will make it possible to save almost half the material (500 tons of steel and lead) on just one sulfuric acid installation, which amounts to a savings of 80 million zlotys. Further application of the invention is planned when sulfuric acid installations are being designed and built.

Some innovative equipment for retreading tires in the 10-28-inch range, developed in the STOMIL-Debica Automobile Tire Factories in Debica, had a hard time reaching industry. It is protected by as many as four patents. Thus far only two units have been made, for the Agricultural Circle Cooperatives in Jodlowa and Tyszawice. It is planned that this year pilot-lot tests will be made to examine the quality of the retreaded tires.

Environmental conditions will be somewhat improved when a new and original technology is applied for reclamation of water-insolubles, particularly benzene and exhaust gases. The technology was developed in the CHEMITEX-WISTON Chemical Fiber Plants in Tomaszow Mazowiecki. Use of the invention in these plants made it possible to recover the benzene which up to this time had been emitted into the atmosphere. The economic savings amounted to 8 million zlotys over the course of a year. Government orders for this year cover adaptational work for other industrial plants which emit volatile-liquid fumes.

Some unique welders for boiler tubes (ZHR-89), the work of engineers in the Power Industry Production and Repair Enterprise in Poznan, are covered by four patents. Up to now our industry imported welders from Sweden, paying 530,000 Swedish kroners per unit, while the cost of our own equipment is only 3.5 million zlotys (in 1978 prices). Thus far only three welders have been produced. and a pilot-lot test will be conducted this year in the ASPA Welding Apparatus Factory in Wroclaw.

The original solutions developed by Polish scientists and engineers turned out to be just as good as other inventions purchased abroad. The Central Annual Plan has covered only some parts of the highest class engineering creativity in its government orders. But this does not mean that inventions of lesser caliber, or efficiency improvements, will not be considered valuable. Frequently small-scale designs and improvements bring large benefits. It is also essential that even in the smallest workplace attention be given to improvements in efficiency.

Linkage of Technological-Economic Progress

Warsaw ZYCIE WARSZAWY in Polish 6 Feb 84 p 3

[Interview with Prof (doctor habilitatus) Roman Ney*, member of the Polish Academy of Sciences, by Bozena Kastory; "Biting Our Own Tail"; date and place not specified]

[Text] [Question] You said recently at a meeting of the leadership of the Polish Academy of Sciences (PAN) that the Polish economy is eating itself. How do you understand this self-consumption?

[Answer] This relates to an economic model. Ours was established in the first postwar 3-year plan and was slightly modified later in the 6-year plan. And

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*Prof Roman Ney, for two terms rector of the Academy of Mining and Metallurgy, is the director of the Power Industry Raw Materials Institute of the Academy.

that is how it remained. In my opinion a fundamental error was made, because the development of the raw materials and heavy industries was projected too one-sidedly and that which was good for the first years of reconstruction and construction was extended over all of 39 years. Individual economic teams criticized this model, but they were not able to free themselves from it. True, after 1956 not only a political but also an economic analysis was made, and the economy began to go in the right direction. But this did not last long.

[Question] Reforms on a larger scale were again successful, after 1970.

[Answer] The country was not in debt and the economy could have been pushed into a good direction, had we invested the money borrowed abroad in a planned and rational way, and not on a case-to-case basis and not necessarily where the greatest pressure was applied. Meanwhile, the top echelon was weak, without ideas, and no ultimate economic model was defined. The money was spent and now no one is able to point to any sector of industry and say "See, what we are doing here is up to a good European standard." This could not even be achieved in relation to the raw materials industries, despite the fact that they were used as the base. Maybe there is only one, the copper industry, that approaches such standards.

[Question] Does this mean that there never was a strategic plan for the development of the economy?

[Answer] There was no good plan. The investments went into energy- and materials-intensive industries, with only one exception--the electronics industry. In the 1970's electronics began to develop, with great effort and at high costs, but towards the end of the 1970's it collapsed completely. Today we have a technological gap in relation to Czechoslovakia and the GDR, and at one time we were much better than they.

[Question] In what areas of the economy is inefficiency most apparent?

[Answer] I will cite an example that is only slightly simplified. We know that we must have energy if industry is to operate. But because we do not use this energy properly, and waste it, there is, in turn, a constant pressure to expand coal mining. But to expand mining we have to have more steel for equipment, machinery, etc. And so the steel mills must increase their production. And in order to do this, they need more energy.

[Question] Thus the circle closes and all of the results remain inside this circle.

[Answer] Yes, because what mining produced the steel mills ate up, and the large part of the steel from the mills went to mining. But profits can only be received from final production, the production that reaches society.

[Question] We have very conscientiously raised a dragon, which eats itself up starting from the tail?

[Answer] Yes.

[Question] But even a dragon cannot eat himself for very long.

[Answer] At the moment it is still doing so. For example, in construction. In our country reinforcing steel used in construction is twice as heavy as it is abroad. This takes more energy, materials, and labor. And that is why our economy is a system which consumes itself.

[Question] Mr Professor: Together with Prof Aleksander Dlugosz, you cited, in an article about our fuels-energy economy which was published by NAUKA POLSKA [Polish Science] late in 1982, the following data: "$1,000 of generated national income in Poland pays for the consumption of 1,290 kilograms of standard fuel, as compared with 1,099 in Hungary, 634 in Austria, and 576 kilograms in France. This shows that our industry consumes on an average of 1.25 to 3 times more energy per unit of final product than do foreign producers. Is there a plan underway to redirect the economy so that these losses will be reduced?

[Answer] I know that the Planning Commision has begun work on such a program.

[Question] Do you see a place in this program for the scientific community?

[Answer] Yes, and that is why I myself am participating in it. We have developed, perhaps still not perfectly, the principles of mineral raw-materials management. However, so as not to always blunder in the same direction: i.e., extract as much as possible. Up to now, only tons have mattered. Instead of adding our scientific ideas and work to these tons, and only then selling them, at a much higher price, we are selling raw materials.

We must take stock of what are country has and go step by step in the chosen direction. Still, what was common in the 1970's is beginning to happen now. The particular subsectors, or ministries, are preparing development plans each on their own and for themselves. And so this is not an optimal plan, insofar as the country's conditions and needs are concerned, and is only, I would say, the derivative of the stereotypes and avoidance of effort on the part of the given ministry. It is true that it may again turn out during the course of implementation that the plan required a great amount of investment, but that for other areas of the economy and for the country relatively little came out of it.

[Question] Do you not believe that there must also be a long-range plan and program for the immediate future? And that someone must correlate both?

[Answer] I believe that there should be two groups of people. One to develop current, operational plans. The other to develop long-range plans. Both have the same boss.

[Question] Who do you think should prepare these plans?

[Answer] We have a Planning Commission, after all. Except that it is my deep conviction, and I have been following this for a long time, that one of the weak spots in the implementation of economic reform thus far are the top-level functions. We had associations, for example. Maybe it was necessary to disband them, but we created nothing in their place, at least insofar as technical progress is concerned. When the Iron and Steel Metallurgy Association functioned, at least in principle by the end of January we had completed

discussions in the Academy of Mining and Metallurgy with the Association on the plan for implementing technical progress for the entire year. Now discussions must be held with each metallurgical works separately, and because they have enormous problems for their machinery is becoming obsolete, there can be no talk about new technological solutions.

[Question] The PAN scientific secretary, Prof Zdzislaw Kaczmarek, reported to the press that last year 10 billion zlotys intended for technological progress were not spent and remained at the disposal of the enterprises.

[Answer] Technological progress is something which from the beginning was not given sufficient attention in economic reform.

[Question] But it is disturbing that the persons responsible for the contact between science and industry are firmly convinced that this time the model of working together is correct. In June, at a conference in the Government Press Office, the Minister of Science, Higher Education and Technology assured those present it is now already much better, insofar as innovations, improvements and inventions are concerned. And 6 months after this meeting we learn from official and reliable sources that 10 billion zlotys allocated for technological progress were simply not expended. They lie in the enterprises in which progress apparently is not essential. Official optimism, in such case, acts as a restraint on timely remedial measures.

[Answer] I agree with you that the situation with technological progress is increasingly worse. Take the Patent Office, for example. It may not be a perfect indicator, but it is an indicator, nevertheless. The number of patents has dropped. There has been a decline in interest, improvement, inventiveness. This is even worse, because it takes place in the sphere of human mentality, and this is always more difficult to reverse and takes more time. It is the same with the large research programs, which, after 5 or 10 years, are obsolete and can no longer be used in practice. For example, one of the main PR-1 government programs, the target of which was the chemical processing of coal. The second 5-year implementation of this program is drawing to an end and I am afraid that we will continue to be unable to build plants which would know how to do this.

[Question] And what do you expect of the Scientific-Engineering Committee which is being established? Will this actually be a center which will be capable of making strategic decisions?

[Answer] I am afraid that something will be established which will be a compromise between different types of viewpoints. And that is the worst that can happen, because a compromise may mean stagnation and low effectiveness. However, the idea itself is good, because in my opinion, the elimination, in the early 1970's, of the Science and Technology Committee, and the naming in its place of the Ministry of Science, Higher Education and Technology, was throwing the baby out with the bath water. I myself worked in this Ministry for 3-1/2 years and became convinced that this resort is not able, regardless of who is there, to direct the country's scientific-engineering progress.

[Question] Why?

[Answer] Because it also concerns itself with higher education and this takes more attention. One not-so-serious, or even harmful, political banner hung out in the university, for example in 1976, aroused greater interest than the fact that 10 or 30 percent of the work done was not applied. No one was called to account for the latter. And so over half of the Ministry concerned itself with the banner, and several persons had to take care of technological progress. Furthermore, a Committee which is supposed to direct science and technology should not have its own research centers, its own institutes, because immediately it transforms itself, as in most of our ministries, into something which has to defend not the state so much as its own confines.

[Question] How will the division of competence be made?

[Answer] So far as I know, the Ministry of Science, Higher Education and Technology wants to retain education and science.

[Question] But this is very difficult to separate, because where does science end and research and development begin?

[Answer] If it turns out that part of science is within the purview of the Academy, part in the Ministry, and part in the Committee, then it would be better if this situation did not arise at all.

[Question] And is another possibility being considered?

[Answer] Basically, no. The materials which have been submitted envisage that the Committee will concern itself only with technological progress, while basic research will belong to PAN, and non-basic research to the Ministry. If it came to that, in my opinion it would be an enormous mistake, because a Committee such as that would not have the strength to fulfill the role for which it was appointed, namely to develop a strategy of operations to cover both science and technology. That body should be, primarily, a collective co-reporter on all developmental plans relative to technological progress. I believe that even the ministries are afraid that a body such as that could a little more thoroughly evaluate their actions.

[Interviewer] Thank you for the interview.

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POLAR RESEARCH DEVELOPMENTS DESCRIBED

Convention on Antarctic Mineral Resources

Warsaw PAP DAILY NEWS in English 6 Feb 84 pp 6, 7

[Text] The 3rd conference on Antarctic mineral resources, attended by member states of the Antarctic treaty, including Poland, wound up its debates in Washington recently.

The debates centred on a draft convention on the utilization of Antarctic mineral resources.

Poland's delegation to the conference voiced the opinion that the convention should be open to all interested parties, and that exploration and future development of mineral resources must be conducted within the framework of the Antarctic treaty.

Antarctica--both on land in neighbouring seas--has rich mineral resources. Crude oil and natural gas arouse particular interest. The existing geological data point to the possibility of discovering substantial deposits of both of them. The development is expected to start not earlier than at the beginning of the next century, but the issues of prospecting and extracting require legal regulations to be set earlier. First of all it is important to ensure proper environmental protection during research and prospecting works.

Poland, as the Antarctic treaty member and a country that conducts exploration work in Antarctica, is fully entitled to participate in decision-making concerning the ways of utilization of the Antarctic natural resources.

For several years now Polish polar expeditions have conducted geological and geophysical research work in western Antarctica--in the region of the Antarctic peninsula and in the south Shetland Islands. They have contributed to broader knowledge of geological structure of the area. Polish geologists made the so-called geological picture of more than 3,000 square kilometres on the Shetland Islands, discovering, among other things, various ores.

New Polar Expeditions

Warsaw PAP DAILY NEWS in English 6 Feb 84 p 42

[Text] 1984, a year that inaugurates the second 50-year period of Polish polar research, will see an increase in the exploration of the Arctic and the Antarctic. The presidium of Polar Research Committee at the Polish Academy of Sciences (PAN) endorsed the research programme for the years 1984-85. A PAN's sea biological expedition aboard the MS PROF SIEDLECKI is now coming to an end. The expedition was part of SIBEX international biological research in the western Antarctica, the aim of which was to estimate krill population.

A sea geodesic expedition is scheduled to be carried out during the Antarctic summer under the sponsorship of PAN's Institute of Geophysics. The expedition will be engaged in geophysical research in the western Antarctic, which will mainly concern deeper structures of the lithosphere under the sea bed in the Bellingshausen Sea south of the Island of Deception. This will be a reference to a similar sea expedition carried out in the years 1979-80 which explored the lithosphere by way of seismic methods.

An oceanographic expedition to the Weddel Sea in the Antarctic is also planned. The research will cover the field of marine physics and chemistry.

Polish-Brazilian Polar Cooperation

Warsaw PAP DAILY NEWS in English 20 Feb 84 p 27

[Text] Brazil, a newcomer to scientific research in the Antarctic, has close ties with Poland, which has already acquired considerable experience in Antarctic exploration.

A Brazilian polar station on the Keller Cape (Island of King George) is situated in the immediate neighbourhood of Poland's Arctowski polar station, which makes possible a close two-way cooperation in research as well as in transport and food and equipment supplies.

At present the Arctowski station plays host to a seven-member group of Brazilian scientists who carry out geological and biological research.

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SCIENCE-TECHNOLOGY PLANS, SHORTCOMINGS DESCRIBED

Plans Stress Economic Application

Warsaw ZYCIE GOSPODARCZE in Polish No 8, 19 Feb 84 p 4

[Text] PAP reports that problems relating to science and technology will occupy a good deal of space in the work of the government this year. For example, in February consideration will be given to a program for developing domestic automobile production--a program that will take into account the necessity to economize on fuel and the need for international coproduction. In April a program for producing and applying diesel engines will be considered. In June: an engineers-training program adapted to the present and future requirements of the economy. Also to be developed are criteria for and assessment of the profitability of importing and exporting selected groups of products from the standpoint of their alternative, effective utilization in domestic production.

By May a register is to be prepared of existing important reports available at scientific-engineering institutes and research-development centers for use in industry, together with a determination of the organizational, supply, financial and investment conditions that are indispensable for this purpose.

Moreover, legislative work in the area of science and technology will be accelerated. By May draft laws are to be sent to the Sejm on the creation of a State Committee on Scientific-Technological Progress, on PAN (Polish Academy of Sciences) scientific institutes, and on scientific degrees and titles. In a short time the law on inventions and efficiency improvements is to be amended. This is very important in view of the collapse of the inventive movement.

In the second half of this year the selection and concentration of scientific research on the research-development and application subjects most needed for the economy will be made. Earlier, during this half-year, a systems-type solution is supposed to be found to accelerate technical and organizational progress in agriculture and in the food industry, using biotechnology. Work in this area is already being done in the Ministries of Agriculture and Science and in PAN. This is necessary because of world trends--the replacement of chemical processes in some sectors of the economy and industry with biochemical processes.

The plan for work during the last six months of the year includes development of a program for use of robots in selected production and transportation technologies. Programs which the government has already approved will be used here, including the electronics-application program. Robotization and automation are becoming increasingly important in view of the possibility of reducing employment of people in jobs that are arduous or injurious to health. Mechanisms stimulating the use of industrial robots are also supposed to be established.

Great importance will be attached to an assessment of the state and effects of the depreciation of fixed assets and the technological gap, and consideration will be given to these conclusions in the formulation of plans for 1986-1990 and 1990-1995.

Among the work of a long-range character, a question of primary importance to our economy will be raised. That is the development of a program for "remodeling" industry based on the processing of domestic raw materials. "Polish specialties" for the years 1986-1996 will be defined, taking into account developments on world markets. Work will also be done on developing the principles of the state's scientific-engineering policy for those years.

Also, a system is to be developed which will provide for state-support to research, development and applications work after 1985. This will include the determination of new research subjects and the principles for financing them. Research programs now underway (government, crucial, interministerial) were defined at the beginning of the last decade. As time went on, a certain deconcentration on research occurred and the focus was not on selected problems but on too large a number of directions. Research cycles grew longer which made it difficult to achieve results within the planned time-limits and to correlate them with the needs of industry.

Economic Reform Hinders Progress

Warsaw ZYCIE WARSZAWY in Polish 22 Feb 84 p 3

[Interview with Prof (doctor habilitatus) Wojciech Zielenkewicz, member of PAN and director of PAN's Institute of Physical Chemistry, by Bozena Kastory: "Technology for the Taking"; date and place not specified]

[Text] [Question] Mr Professor: More and more frequently we meet with the opinion that the matter of the development of technology has been overlooked in economic reform. Prof Jan Szczepanski said at the last meeting of the Sejm's Commission on Science and Technical Progress: "The logic of the present economic system dictates that we follow known examples and avoid innovation." Prof Roman Ney, director of the Power Industry Raw Materials Institute at the Academy of Mining and Metallurgy, at a meeting of the leadership of PAN last January, said: "Technical progress is something which from the beginning was underestimated in reform. As a result the number of patents has dropped, the interest in efficiency improvement has declined. The same thing is happening in the area of large research programs, which after 5 or 10 years are still unsuitable for practical use." In your recent speech at the Sejm you added to these comments, saying that important Polish technologies, developed for the needs of the chemistry of coal, are lying around in the files, ready for the taking. Only no one seems to want to do this. Is this also connected with reform?

[Answer] With reform and the general lack of money for investment. Insofar as reform is concerned, it has not created an incentive for large-scale activity. Ideas for small-scale production are useful, but no one wants to make use of large-scale ones. Small-scale production technology is experiencing a real boom. Many institutes and enterprises, many private firms and Polonia companies, are expressing an interest in products and technologies which were developed in past years in the Institute of Industrial Chemistry or PAN's Institute of Physical Chemistry. We are even losing some of our employees, who are going elsewhere because they are getting many offers, and no where will they receive less than in a scientific institute.

On the other hand, large-scale technologies such as the technologies for processing coal, sulfur or copper, do not arouse enough interest, because large industry is needed for this, and large industry does not have the money for investment.

[Question] In other words, the situation is exactly the reverse of what it was in the 1970's. At that time, only large investments, and large-scale production were given any thought. And we were happy to import glue and pharmaceuticals.

[Answer] Now, in view of the restrictions on large investments, the input into the mastery of large-scale production technologies remains untouched. There are no buyers for what we did with the thought of large-scale production. I say this also because sometimes we are accused of being alchemists, who promise gold but make sand. Yet among chemists there are many people who are living through the tragedy of having made a commitment to large and important technologies which are not being used.

[Question] You mentioned the technologies of coal-processing. I believe that your master, and that of your colleagues, was Prof Wojciech Swietoslawski, who before the war established the coal department in the present Institute of Industrial Chemistry, and after the war, the scientific school in which several dozen highly qualified scientific workers occupied themselves with the chemical processing of coal tar. How do you, Sir, having come from this group, assess the present status of Poland's coking industry?

[Answer] Actually I myself specialize in microcalorimetry--those are methods of determining various thermal effects--nevertheless, I regard the matter of utilizing such riches as coal to be of primary importance for our chemical industry.

We are really wasting that which is in the products derived from hard coal. We are wasting an unusual resource of chemical substances contained in coal tar. We are conducting difficult research on coal-gasification problems outlined in a government program. The fact that among government programs it is No 1, attests to its importance. But in addition to the higher generation of coal-processing technologies, less sophisticated methods of processing coal are known. They do not have to be sought. They have been used for years. One, for example, from coking products, is coal tar, which contains an entire gamut of very valuable organic substances. And all of this is being wasted. In the 1950's the situation was much better than it is this year.

[Question] And what happened with the "Hajduki" Chemical Works, which at one time specialized in coal-tar processing?

[Answer] It now specializes in paints or lacquers, I don't know exactly, but in any case coal tar is no longer being processed. And 20 years ago, 52 much-needed products were produced there from tar, including benzol, anthracene, naphthalene, and benzene. That was a plant that conducted deep-processing of coal tar.

[Question] Has not the fascination with the petrochemical industry contributed to the cavalier treatment of the chemical processing of coal?

[Answer] Madam, during the 75th anniversary of the "Hajduki" Coking Works, and that was 20 years ago, the deputy minister of the chemical industry gave the following assurance: "Putting the development of the petrochemical industry into the new economic program will neither exclude nor hinder the development of the chemical processing of coal." And further: "We must see to it, therefore, that all of the coal tar obtained from coking is managed efficiently and processed into the purest production, which is increasingly in demand domestically and abroad."

[Question] Despite these assurances we have regressed greatly in the coking industry. And are there still people who could make up for this?

[Answer] We are an excelllent scientific cadre who knows the problems of coal-tar processing. In PAN's Institute of Physical Chemistry we are doing basic research on the utilization of coal. At the Institute of Industrial Chemistry, which belongs to the Ministry of the Chemical Industry, work is being done on processing of coal-tar products. It is the same at the Institute of Chemical Coal-Processing. But I think that matters relating to coal should be dealt with on a broader scale. The ministerial centers as well as the Polish Academy of Sciences have both the duty and the ability to do this.

[Question] Much of the technology for coal processing has already been developed. What is happening, for example, with benzol production? This is one of the most important Polish technologies in the chemical processing of coal.

[Answer] The answer is that nothing is happening. And this was a plan for installations producing 300,000 tons of benzol every year, which would meet the country's requirements, and the raw materials would be the tailings from the production of coke.

[Question] This technology was described as being the success of the Institute of Industrial Chemistry, which skilfully cooperated with the Wroclaw Polytechnic, the PAN Institute of Physical Chemistry, the Institute of Heavy Organic Synthesis, and other scientific centers. But scientific centers alone cannot produce benzol. Industrial plants are needed.

[Answer] In 1980, the Ministry of Chemical Industry confirmed the engineering and economic assumptions of this investment. And thus far nothing is happening insofar as benzol is concerned. Unfortunately, there is no money for investment.

I think that aside from this lack there is another one. The lack of awareness that riches such as coal should be utilized and not wasted. Were it otherwise the money which we had in the 1970's would be allocated for the chemical processing of coal.

[Question] In addition to coal, you mentioned several other important technologies. For example, the plan for commercial production of anthracene.

[Answer] Yes. Anthracene should also be produced from coal tar, which at this time is being wasted. It is true that the "Blachownia" Chemical Works is producing a small amount of anthracene--about 1,500 tons, and selling it at $700 a ton, but this is an anthracene which contains only 40 percent pure product. However, over four times as much money can be gotten for a 95 percent pure product, because the price on the world markets is $3,000. And we have the technology and plans already developed for this kind of production.

The same applies to anthraquinone, which is a raw material for the production of dyes, and used in the cellulose industry it greatly increases the production capacity of paper. For 6 years now we have had the technology and plan for a process of obtaining phenol. Each year Poland has a shortage of several thousand tons of phenol (and our drinking water has a large excess of it), and many other substances. They are needed for industry, and since there is no domestic production these substances have to be imported.

[Question] Isn't this a paradox? We have coal in Poland and there are, as you say, groups of people fascinated by the chemical processing of coal. But there is no chemical processing of coal. There is no processing, on a suitable scale, of even those products which we have free, such as wastes from the production of coke. Coal tar is being wasted, other sources of valuable chemicals also, because first the fashion was for large investments and the middle-size ones were eliminated, and now when we see that both one and the other are needed, there is no money. Don't you believe that this is also the result of a lack of strategic thinking which would encompass more than just the matters of a single ministry and one 5-year plan?

[Answer] I think that this, too, is important.

[Question] A decision has been made to appoint a Committee for Science and Technical Progress. What role do you see for such an organization?

[Answer] The state should have an instrument through which it controls not only the development of basic research but also technical progress. Actually, in all countries of the world there are such types of institutes or government organizations. A Committee for Science and Engineering has existed in the Soviet Union for a long time now. It is the same in other socialist countries. In Poland it was eliminated many years ago. In the West, these types of institutions have different names, but they are also the equivalent of such a Committee. The world is integrated. In every country there must be an office that decides strategic matters relating to technical progress, the directions of the development of the economy, the modernization of industry, patents, purchases of licenses, and exchange of scientific thought.

[Question] I believe that the difficulties pertain to a division of competence among the Ministry of Science, Higher Education and Technology, the Polish Academy of Sciences, and the State Committee on Scientific-Engineering Progress.

[Answer] There are, after all, throughout the world, well-known and proven systems for managing science and I do not see why it should be any different in Poland. It seems to me that it would be best to have a system similar to those that exist elsewhere.

Everywhere in the world there are institutions such as academies of science, counterparts to the committees on science and engineering and counterparts to ministries of schooling. And whether the latter are called a Ministry of Public Enlightenment or National Education is of no importance. As long as their name does not mislead the people with whom they are working. I believe that in this system of management, science can achieve a great deal. All it has to do is to apply itself. And the misunderstandings as to division of competence have gone on too long. We should put an end to the period of meditation and exchange of experience. For the good of our scientific schools, technical progress, and the modernization of the economy.

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DIRECTIONS, ACHIEVEMENTS OF RESEARCH IN CHEMISTRY

Bucharest MAGAZIN in Romanian 7 Jan 84 pp 4, 5

[Article by Dorel Dorian]

[Text] The growing role of chemistry in the contemporary world, its exceptionally strong effects and creative implications in the most diverse areas of activity, and the prestigious scientific achievements of Romanian chemistry--increasingly recognized and valued internationally--are evident today. Problems of the first magnitude in our socioeconomic life, from the creation of new materials and substitutes to the comprehensive utilization of mineral and vegetal resources, depend directly on the innovative, highly demanded, and brilliantly confirme d contribution of chemistry. This is the genesis and meaning of this article, which we dedicate with justifiable pride to Romanian chemistry, to its exceptional achievements in research, and to its direct contribution to the country's progress and multilateral development. And it is also the source of the topics which we will discuss below:

Priority directions of chemical research and its distinctive nature;
Great achievements in macromolecular compounds;
Superior utilization of resources--a priority objective for chemistry;
New requirements for fine organic synthesis;
Moment of truth for biotechnologists.

These pages were made possible by the gracious contribution, in words and experience, of prestigious specialists at the Central Institute for Chemistry (ICC), whose activities are fully involved in these topics.

Modern, Unified Concept of Exceptional Scientific Rigor

Consensus with international practices and developments--Original technologies and projects--Concentration of all efforts on major problems of the economy

Maria Ionescu, director general of ICC--The sustained development of the Romanian chemical industry, in keeping with the entire development of the country during the past four five-year plans, bears the creative imprint of the ideas, scientific vision, and initiative of the secretary general of our

party, president of Socialist Romania, Nicolae Ceausescu. His fiery patriotism and his unbounded confidence in the nation's creativity, have been for those of us who work in chemistry a spur and an exceptionally mobilizing example, both in the continued fulfillment and development of the chemical industry--with an average annual growth rate of 18-22 percent--and in the achievement of a comprehensive and diversified production profile, based on our own scientific research, in keeping with the demands of modern practices.

Well known among these developments is the evolution of chemical fertilizers, petrochemistry, synthetic rubbers, plastics, chemical fibers and filaments, as well as the broad diversification of organic synthesis products in pharmaceuticals, dyes, detergents, lacquers, and so on, to the point where our production per inhabitant is comparable to that of developed countries for some of these products.

Scientific and technical research in chemistry has represented the major factor in the development of the chemical industry. A decisive role in the organization and consolidation of this fundamental and applied research activity, to meet the needs of various stages of development, has been played by Dr Elena Ceausescu, first vice-first minister of the government and chairwoman of the National Council for Science and Technology (CNST); as scientist, researcher, and head of the institute, she has guided our daily activities toward problems of major importance to our country in order to satisfy the demands of all branches of the economy, and to formulate and establish an new model of research organization which has subsequently served as the basis for the organization of all research throughout the nation. ICI was thus created in 1970, to group all chemistry research institutes, centers, departments, and laboratories at industrial sites, as well as the research activity conducted in specialized higher education departments; added to these in 1973, were technical design and engineering institutes, thus combining in a single organ the operation of all efforts involved in the development programs of the chemical industry.

Under the higly competent leadership of Dr Elena Ceausescu, great successes were obtained in chemical research, whose concrete results were the domestic implementation of technologies and development projects in the chemical industry (80-82 percent in 1975-1980, and more than 95 percent during the current five-year plan); the creation of a powerful group of chemists with valuable experience in all specialities, in research, and in production; and the development of the material base necessary for the activities of the current stage of evolution. Through its realistic, modern concept, receptive to all the demands presently encountered throughout the world, ICC's new organizational form has allowed an efficient, rapid approach to research in unconventional technologies, as well as the exploitation of new sources of raw materials and energy. Given the determining influence of the chemical industry on agricultural production, concurrent research developments were achieved both in fertilizer and in pesticide synthesis, to fight against all the harmful agents capable of affecting the yields of agricultural production. At the initiative of Dr Elena Ceausescu, the pesticide section was expanded into a specialized institute. The coverage of programs in agricultural

development was thus constantly broadened: the orientation and legitimate need to seek the level of world concerns, has simultaneously led to the development of research in biostimulators for livestock, in fertilizers for useful plants, in pheromones for insect destruction, in inhibitors for harmful plants, in synthetic proteins, and so on.

The establishment of the Institute for Chemical and Biochemical Energy, also at the initiative of Dr Elena Ceausescu, has made it possible to undertake totally new research projects in biotechnology applications, the exploitation of biomass, the production--from other sources than oil--of raw and other materials needed by the economy, the formulation of electrochemical synthesis technologies, and so on, projects and solutions for which large applications are foreseen in the near future.

As shown at the 29th International Conference on Macromolecules, held in Bucharest, another achievement of the institute--fruit of the same highly competent leadership of Dr Elena Ceausescu--has been the creation of new types of rubbers for tires and other technical needs. On the basis of these technologies, large production facilities were built for polyisoprene rubber, another one for a terpolymer elastomer as substitute for natural rubber, and in 1983, an installation for polybutadiene rubber; to this will be added in 1984 a new type of rubber known as thermoplastic, eagerly awaited by the light industry sector.

It can be said that the chemical industry has become an essential factor for economic progress, making a direct contribution to the multilateral development of the national economy while effectively participating in the production and development of other branches; this participation, a constant objective of CNST, has led to the fulfillment of programs in electronics, microelectronics, nuclear energy, organic intermediates, reagents, additives, the exploitation of low quality ores and organic salts, and so on, in order to manufacture with domestic resources valuable products which were once imported, while also meeting the demand of all consumers.

In the spirit of the message addressed by Nicolae Ceausescu to our nation, we are firmly determined to fulfill the objectives for 1984, further contributing, through the orientation and concentration of our activities on the major problems of the economy, to the continued development of Romanian chemistry.

Valuable Chemification

Value growth of 50-fold by increasing the chemification of hydrocarbons from oil--Active substances for advanced fields in industry and agriculture

Dr Rodica Stoica--Although the exploitation of chemified hydrocarbons involves less than 10 percent of the world's total crude oil production, it provides a greater income than the remaining 90 percent that is consumed as energy. As an example, the chemification of hydrocarbons worth 1000 lei can yield products valued at over 50,000 lei, or their chemification into low tonnage synthesis products--pharmaceuticals, dyes--can achieve values of more than 100,000 lei.

Romanian research has resulted in the fabrication of the major groups of chemical products which characterize the development of technologies for the chemification of natural hydrocarbons, namely elastomers, synthetic fibers, plastics, detergents, and so on. In turn, these groups of products have allowed the development of the textile industry and of consumer goods, and have penetrated into civilian and industrial construction, chemical equipment, machine building, electrical engineering, electronics, and aeronautics, briefly, in all the areas of contemporary civilization.

In the field of surface active materials--basic substances for detergents and additives--hydrocarbons are and will remain a fundamental raw material (particularly ethylene, propylene, and benzene). The transformation of these hydrocarbons involves a number of synthesis processes which ultimately transform them into intermediary active substances for detergents and for auxilliary products in leading fields of industry and agriculture. The development and use of additives is justified by their efficiency in many processes, keeping in mind that small amounts of these products--of the order of 2-3 percent--have significant effects in many advanced branches such as oil extraction, ore flotation, synthesis and processing of synthetic fibers, textiles, paper, leather, pharmaceuticals, and cosmetics manufacturing, construction, and agriculture.

Cost/performance ratio is a decision factor in undertaking research into products with a high level of raw material processing; and particularly in petrochemicals.

In the area of surface active substances--detergents and additives--based on petrochemicals, it is important that technical processes be constantly improved, since only 25 percent of the finished product costs in this area are directly tied to the cost of the crude oil, while 75 percent are influenced by investments and production expenses. The improvement of processes and the formulation of new technologies with lower energy and materials consumption is a concern of the first magnitude for us.

In these directions, our research has led to the creation of modern technical processes, to finished products for several industrial branches, and to auxilliary products which until recently were imported, and which in fact determine the success of processes in many leading industries.

Recently, following the indications of our party's secretary general, Nicolae Ceausescu, who recommended a higher production of valuable fine synthesis chemical substances, projects were formulated to provide value comparison factors for products manufactured or being industrialized on the basis of domestic technologies, in order to adopt optimum development approaches under conditions that are competitive for exportation.

Research of Recognized International Value: Synthetic Elastomers

Efficiency of macromolecular compounds--Reinforcement of polymers with glass fibers

Dr Felicia Stoenescu and Eng Silvia Bittman--Research departments concerned with technologies for synthesizing polymers and copolymers with applications in elastomers and plastics, have undergone outstanding development in the past two decades. As we know, this comprehensive research has been conducted under the guidance of Dr Elena Ceausescu, scientist of international reputation, who has made extremely important contributions to macromolecular chemistry, especially in the field of polymerization and copolymerization, leading to a better understanding of chemical process mechanisms and to a more effective contribution from chemistry to mankind's well-being.

Macromolecular products have continuously evolved, with an entire group of high technology branches in our economy demanding the supply of new materials with special priorities, among which are macromolecular compounds. It is now unanimously recognized that the present world circumstances tend to favorize macromolecular compounds, which consume less energy than many of the conventional materials, such as metals. Added to this is the fact that in the field of elastomers--from huge tires to the smallest and most intricately shaped technical items--synthetic elastomers are replacing the natural rubber that must be imported.

The research that has led to the formulation of technologies has also been the basis of projects for high capacity installations, with the result that a very high percentage of natural rubber has been replaced through their gradual placement in operation in such sectors as tires, technical items, and consumer goods.

Among last year's achievements we can cite the research, design, and completion of an industrial installation to manufacture thermoplastic elastomers for the shoe industry. It should be pointed out that these elastomers are processed without vulcanization, thus with substantial savings in energy consumption, as well as without losses since all the scrap can be recycled in the process.

Another research direction in elastomers is that of chemical modification, a process designed to improve the properties of the basic polymer. One outstanding achievement in this respect is the research to synthesize modified polyisoprene, a polymer whose properties will gradually lead to its greater substitution for natural rubber wherever the latter is used in the production of tires with special characteristics.

First among the results obtained in plastics during 1983, are those achieved in industrial installations: new types of vinyl chloride polymers and copolymers, a polyol polyester for polyurethane foams with excellent automotive applications, and an epoxy resin for reactive casting under pressure, a modern process with low energy consumption.

As in other years, during 1983 Dr Elena Ceausescu has guided the research in macromolecular products toward original solutions, superior from a technical and economic standpoint, and with new features that have been the subject of a large number of patents in Romania and abroad.

In parallel with applied research, 1983 once more confirmed the value of Romanian scientific research in macromolecular chemistry, with Bucharest hosting the International Conference of the International Union of Pure and Applied Chemistry, and with the papers presented by the Romanian researchers, and the value of their work--performed under the direct guidance of Dr Elena Ceausescu--demostrating the constant concern that exists to develop scientific activity in our country.

A Field of Great Promises: Biotechnologies

An inventory of nature's raw materials--Biomass, an alternative resource--Researchers' attention on enzyme mechanisms

Dr Radu Giurca--As a result of Dr Elena Ceausescu's valuable initiative and her constant concern to encourage the development of new ideas in science, the Institute for Chemical and Biochemical Energy was formed in 1980 as part of ICC. Conceived at the highest scientific and organizational level, and benefiting from exceptional guidance, the institute despite its youth, aims at and achieves leading technologies, scientific interests among which biotechnology plays an important role.

The importance given to biotechnology in our research results from the development of Romanian science, but also represents an alignment with the general trends of world scientific research. Associated with these two aspects, biotechnology is an imperative need for society's development. The exceptional comments and indications provided by Nicolae Ceausescu during his recent visit to ICECHIM, have determined--as for the other branches of chemistry--significant orientations and solution for Romanian biotechnology.

Structured either on the processing of nature's inventory of raw materials, from which a new inventory can be obtained through physicochemical methods, or on processing with nature's own methods, but biotechologized this time, biotechnology is not only a new academic discipline, but rather and especially a potential for using microorganisms, vegetal and animal cells, and subcellular fractions, constituting one of the most attractive combination of fundamental and applied research.

The domain and economic potential of biotechnologies are enormous. As an instance, the present energy strategy imposed primarily by the oil crisis involves biotechnology in economizing primary energy through processes and technologies characterized by lower energy consumptions on one hand, and in exploiting alternative sources of energy to complement or replace conventional ones, on the other. In this respect, biomass, a large alternative resource for our country, estimated for a long time at an average of 100 million tons of dry matter per year, represents the basic raw material for biotechnologic processing. The specialized department of the Institute for Chemical and Biochemical Energy has perfected laboratory processes designed to comprehensively exploit the biomass.

Processed in automated reactors of domestic design, fabricated in collaboration with the Central Institute for Machine Construction and with the Grivita Rosie Chemical Plants, various categories of biomass among which are aquatic plants, reeds, rushes, fast-growing wood cellulose species, grapevine shoots, Jerusalem artichokes, forage beets, and sweet sorghum, have formed ideal substrates for microbial conversion. The more than one thousand microbial stems selected at the institute represent the primary effort of researchers involved in obtaining exceptional results.

Also of special importance is the research to learn about enzyme mechanisms in biosynthesis processes and in the enzymatic hydrolysis of various categories of phytomass. During a first stage, the biotechnology laboratory is especially interested in obtaining through its own processes various categories of enzymes that now must be imported and that are absolutely necessary in medicine, pharmaceuticals, detergents, and so on, but in the next step, the enzymes it produces will become industrial biocatalysts used in technologies that consume litte energy and are non-polluting.

Fine Organic Synthesis on the Verge of Completion

Eleven specialized programs in full progress--New ways to assert scientific creativity--Pharmaceuticals, dyes, pesticides, fragrances for cosmetics

Dr Dan Bretcan, Dr Mihai Elian, and Dr Emil Georgescu--Fine organic synthesis is a branch of organic chemistry which, starting with simple raw materials, produces substances with complex structures such as pharmaceuticals, dyes, pesticides, fragrances for cosmetics, and so on. It also affects other branches of the economy which use plastics, rubber, and textiles, since important qualities of these materials, such as strength and wear resistance can be improved significantly through the addition of relatively small amounts of substances (additives) obtained with fine synthesis processes.

Its economic aspects are also important. Because the processes are very complex, they involve a large amount of work, resulting in an exceptionally advantageous exploition of raw materials, and in high product values (hundreds of thousand lei per ton). In keeping with the tasks of the current period, aimed at increasing the proportion of fine synthesis in the chemical industry so as to increase the level of exploition of raw materials, the number of products of high value and competitivity, and reduce importations, 11 priority research programs have been formulated in this field, with ICECHIM making a decisive contribution to their fulfillment.

One area of research and production in which fine organic synthesis is well applied with good results, and which imposes its further development, is the fabrication of chemical substances for agriculture.

ICECHIM has had and continues to have a major interest in this direction. The researcher collective in this area of activity is developing projects aimed at manufacturing technologies for modern pesticides of complex chemical structure and exceptional properties, highly effective in fighting diseases, pests, and weeds, and with a low level of residues in agricultural food products, water, and soil.

The researcher collective in the area of chemical substances for agriculture is devoting particular attention to the efficient exploition of the experimental-production installations with which it concurrently clarifies technical problems and produces fine synthesis chemical products which complement the needs of the national economy.

One area of demonstrated tradition and one which has given important results, is that of dyes. More than 90 percent of the dyes that are now produced at Colorom in Codlea and Sintofarm in Bucharest are based on technologies formulated by ICECHIM researchers. It is also noteworthy that no technology for dyes or specific intermediates has been imported. Consequently, while dyes (not to mention intermediates) were entirely imported 30 years ago, as a result of the investment effort and domestic research, more than 60 percent of the domestic needs are met from Romanian production, and more than 35 percent of this production is exported. The structure of manufactured products has radically improved in the meantime, so that along with the older classes of dyes there have now been created new types of modern dyes with an advanced level of processing, such as pigments, dispersions, cationic paints, optical whiteners, and so on. Altogether, Romania is now manufacturing nearly 300 varieties of dyes and more than 100 intermediate products based on technologies primarily oriented toward a superior utilization of domestic materials.

Good results have also been obtained in other areas. The fragrance program for instance, has studied a whole range of technologies whose objective was to reduce importations in the cosmetics and perfume industry.

As we have seen, fine organic synthesis makes it possible to obtain much needed products, affects other branches of the economy, and leads to high profitability, while allowing a superior utilization of the country's raw materials resources, and implicitly asserting the Romanian scientific and technical creativity.

Integrated into the vast research and development activity coordinated by CNST, and exploiting the traditions of nature's chemistry with the instruments of modern science, chemical researchers--as well as the entire scientific front--are determined to contribute in full harmony with the country's exemplary engagement of will and labor, to chemistry's uninterrupted progress and to the greater general well-being of mankind.

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